



Part I. AGRICULTURE IN A CHANGING WORLD



The Challenge of Change

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Change is inevitable. Everyone can think of times—the good old days—when change seemed to take place slowly compared with today. Yet at almost any time in human history the people living then thought that they were in a period of major change.

Forty-five years ago, the theme of the Yearbook of Agriculture was *Farmers in a Changing World*. It began with a summary which said, in part: "The year 1940 marks the end of a decade that has seen more swift and far-reaching changes in agricultural viewpoints and policy than perhaps any other decade in the history of the United States. . . . we do face profound changes and we must do something to adjust ourselves to them." These words foretold one of the greatest changes in agriculture the world had ever seen—the tremendous increase in agricultural productivity after World War II.

By 1961, the foreword to the Yearbook of Agriculture, *Farmer's World*, stated that "At no time in thirty centuries has world agriculture faced greater problems, greater challenges, and greater opportunities. And at no time has American agri-



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culture been so closely connected as now with world agriculture.”

Farming in the Old World

There have, of course, been many periods of major change in the past. Civilization itself began some 10,000 years ago, or perhaps considerably earlier, when people first planted seeds and tamed animals. Agriculture spread slowly and steadily through most of the world, with perhaps separate places of origin in some of the continents. Over the centuries our farming ancestors accomplished feats that farmers today

Ancient Egyptians tamed wild stock, the forerunners of domestic animals grown today. The early farmers accomplished feats that modern farmers have not yet duplicated.

have not yet duplicated. Drawing upon wild stock, they developed all the major food plants and domestic animals grown today. When agriculture appeared in written history in the time of the Egyptians, Greeks, and Romans, and even earlier for the Chinese, it was already a highly developed art, backed by years of progress based on observation and trial and error, and was one of the

important bases of international trade.

Although Roman and other agricultural writers urged improvements in farming and some were made, these mostly disappeared during the Middle Ages. During the 18th century, a number of large farmers and agricultural reformers in western Europe, particularly in England, demonstrated that farming could be improved. More efficient plows, grain drills, and threshing machines were invented even though they were not widely adopted. Former open-field farms in England were enclosed, with much arable land being converted into pasture. Livestock were improved and more productive crop varieties introduced. Many small farmers and laborers, however, were forced to leave agriculture.

Farming in the New World

Meanwhile, English colonists had settled in Jamestown, Virginia, and Plymouth, Massachusetts. They survived mainly because they learned from the Indians how to grow corn. As more settlers arrived and moved west, they learned to cope with the new environment. At the time of the Ameri-

can Revolution, most farming methods and tools differed little from those of 2,000 years earlier.

After the Revolution, settlers continued the westward movement, but farming changed slowly. One exception came with the invention of the cotton gin by Eli Whitney in 1793 and the consequent spread of cotton growing across much of the South. Other machines, such as an iron plow, a horse-drawn grain reaper, and a corn planter were invented, but farmers were slow to adopt them.

First American Agricultural Revolution

The Civil War, with its unlimited demands, labor shortages, high prices, and patriotic appeals to produce brought major changes to agriculture. Congress passed four important agricultural reform laws in 1862. The Homestead Act granted 160 acres of western land to persons who would live on it for 5 years. The Morrill Land Grant College Act gave every State unclaimed western land to be used for founding colleges to teach agriculture and engineering. The Department of Agriculture was established, and land and funds were ap-

propriated to build a transcontinental railroad.

As the war continued, more and more farmers turned to horse-drawn machinery to replace the young men in the armies. Some farmers then bought more land because, with the new machines, they could crop larger areas. As the war ended, most farmers had changed from the old hand agriculture to the new horse-powered machinery.

This change, sometimes called the first American agricultural revolution, turned American farmers from self-sufficiency to commercial production. And by the 1880's, American exports of cotton, meat, and wheat were dominating world markets.

Agricultural Changes Elsewhere

The United States was not alone in increasing its total volume of agricultural exports after 1865. Argentina, Australia, Canada, and New Zealand became competitive in shipping grain and livestock products to Europe, although commercial agriculture began about a generation later than in the United States.

Japan turned to the United States to help modernize its ag-

riculture in 1871, when it persuaded Horace Capron, head of the newly established Department of Agriculture, to leave that post and lead a developmental mission to that nation. Despite difficulties, the mission had much to do with paving the way for better farming in Japan. Russia, Japan's rival in the Far East during the second half of the 19th century, liberated its serfs in 1861 and gave them allotments of land, a change that did much to encourage agricultural productivity.

Change in agriculture continued in the more advanced nations up to World War I. U.S. agriculture reached a balance with the rest of the economy. The growing industrial cities of the United States and Europe were absorbing farm products from many parts of the world. So far as agriculture was concerned, there was a virtual worldwide equilibrium between supply and demand.

World War I Leads to Overproduction

World War I upset this equilibrium in a number of ways. Pushed by patriotism and pulled by high prices, U.S. farmers increased their produc-



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tion beyond anything that world markets could absorb after the war and European production returned to normal. Farmers saw prices decline by half between 1919 and 1921, the immediate postwar years. Over the next decade, farm prices and land values declined steadily, eventually dragging the United States into the Great Depression.

Great Depression

The depression became worldwide in the early 1930's and world trade in farm products virtually came to a halt. During the 1930's, a series of laws in the United States provided price supports for major farm products in return for farmers cutting back on acreage planted. Other laws provided for farm credit, rural rehabilitation, rural electrification, soil conservation, and the distribution of surplus food to the needy. Many other industrialized nations also undertook programs to aid their farmers. Prosperity returned slowly to farmers in most nations during

the 1930's. Then World War II brought major changes.

Second American Agricultural Revolution

During the war, the demand for farm products seemed to be unlimited and, in most nations, price controls rather than price supports were emphasized. U.S. farmers were guaranteed high supports for 2 years after the end of hostilities.

Demand, high prices, and labor shortages led to what has been called the second American agricultural revolution, a change which has affected the farms of much of the world. During and just after the war, farmers completed the change-over from animal to mechanical power.

New machines were only one aspect of the second agricultural revolution. Mechanization and many other changes constituted a package of practices, or what has been called the application of systems analysis to farming. These other changes included the controlled application of lime and fertilizer, adoption of soil conservation techniques, irrigation where necessary and possible, the creation and use of improved varieties of plants and breeds of animals, the adoption

Horsedrawn farming triggered the first American agricultural revolution and changed agriculture from self-sufficiency to commercial production. (Minnesota, grain elevator.)



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of hybrid corn (developed in the twenties to yield much more than varietal strains traditionally being planted), the formulation of carefully balanced feeds for livestock and poultry, the more effective control of insects and diseases, and the use of chemical weed killers and defoliants.

The effects of these practices on agricultural output were dramatic. Both production and productivity reached heights never before thought possible. In many respects rural life was affected just as profoundly because of the consolidation of farms and the sharp decline in the farm population. These changes were most noticeable in the 1950's and 1960's, but

Increased demands during World War II put U.S. agriculture into the motorized era and with it came sweeping changes which have made U.S. agriculture what it is today. (Alabama, shipping shed.)

continued on a lesser scale into the 1980's.

U.S. Assistance to Other Countries

As high price supports and adoption of new technology brought about increases in production in the early 1950's, surpluses developed. In 1954, the Agricultural Trade Development and Assistance Act, better known as Public Law 480, was approved. The Act provided for selling the surpluses to developing nations for

“blocked currency,” that is, money that could be spent only within the nation making the purchase, and for donating surpluses to nations suffering disaster.

The law had two purposes: to dispose of surpluses that were overhanging the market, and to aid developing nations in improving their agriculture. Helping other nations improve their agriculture—an activity that had many precedents—was not seen as encouraging competition with American farm exports, but as helping nations develop sound agricultural bases that would enable them first, to develop and maintain their independence and second, to become customers for American industrial and agricultural products. While all the hopes of the proponents of the legislation have not been realized, many have. Even before Public Law 480 was passed, the United States helped Italy, West Germany, and Japan, for example, restore their agriculture, and today they are among our most important trading partners. Later, under Public Law 480, the United States helped Israel, South Korea, Formosa, Morocco, and Egypt, for example, develop their agriculture. Now

these nations buy both our agricultural and industrial products.

The United States cooperated with foundations and international organizations in the 1960's in alleviating drought-induced starvation in India and in modernizing Indian agriculture. Millions of Indians were saved from starvation. Today, India is essentially self-sufficient in the production of wheat, importing small quantities in some years and exporting in others with year-to-year weather being an important factor.

Other nations in South Asia, notably Pakistan, Sri Lanka, and Bangladesh, have increased agricultural production over the past two decades through the adoption of the newly developed high-yielding strains of wheat and rice. The same thing is true of several nations in Southeast Asia, with corn becoming more important in Thailand.

Conservation Projects

Just as improved grains and livestock have changed world agricultural production, people have been changing the face of the earth. Crossing the western United States by air, we can see large circles where pivot irri-

gation is being carried on, while alternating strips of brown and green testify to soil conservation. Egypt's Aswan Dam on the Nile, although controversial, permits a controlled use of the former flood water.

The usefulness of a full-scale conservation project is seen in the Snowy Mountains Project of Australia, the world's driest continent, where three river systems have been diverted to convert hundreds of miles of arid but fertile plains to productive land. Intensive soil conservation methods have been undertaken, and grazing is controlled to prevent silting of the reservoirs and damage to slopes. The two main products of the plan are power for new industries and irrigation water for agriculture, with recreation and a tourist industry as important byproducts.

Weather Still a Problem

Weather is the greatest question mark faced by world farmers, most evident in sub-Saharan Africa. Some years ago, improved seeds and methods were introduced into several of these nations, but continued drought has made bare survival, not increased production, the goal.

Harvests in the U.S.S.R. vary substantially from year to year, mainly because of weather variations. Shifts in agricultural policies by the central government also may account for some of the shifts in production.

EC Formed

Changes in the agricultural policies of many Western European nations came about with the organization of the European Community (EC). Not all EC nations adopted identical policies. For example, France attempted to preserve the small family farms, while some nations encouraged consolidation where that was most productive. Emphasis on improving farming methods, combined with subsidies and the opening of broader markets, led to substantially increased EC production which, in turn, resulted in surpluses of some commodities, with determined efforts by EC nations to increase exports. This marked change in European agriculture over the past two decades has meant fewer markets and more competition for U.S. farmers.

Although the United States also has emphasized exports during the 1970's and 1980's, this is not a true change but a



Tim McCabe

return to the situation from colonial days to World War I when many U.S. farm products dominated world markets. A change has come, though, in one respect—we now think in terms of world production and world trade.

Changes Ahead

What will be the changes that influence U.S. agriculture over the next three or four decades? First, exports will be even more important than they are today as communications improve and nations lower their trade barriers. Second, U.S. farms will be large, commercial, family-operated enterprises. Third, additional mechanization will further reduce farm drudgery.

The family farm is increasingly a large commercial enterprise. New technology will reduce drudgery. Careful use of water, soil, biotechnology and computer science will increase productivity. (Maryland, family farm.)

Fourth, productivity will continue to increase by the more careful use of soil and water, by the adoption of crops and animals modified through research in biotechnology, and by the application of computer science to farm operations. Finally, the farmer and his family will enjoy virtually all the amenities of the city dweller while still having the feeling of being a group apart that works with soil, water, and seed to provide food to people throughout the world.